

WHAT IS CLAIMED IS:

1
2 1. A method of manipulating a disc tissue of an intervertebral disc, the disc
3 having a nucleus pulposus, an annulus fibrosus, and an inner wall of the annulus fibrosus, the
4 method comprising:

5 providing a catheter having a radiofrequency electrode at a distal region of the
6 catheter and a proximal region for externally guiding the distal region of the catheter within
7 an intervertebral disc;

8 positioning the electrode at the inner wall of the annulus fibrosus by applying a
9 sufficient force to advance the catheter through the nucleus pulposus to the inner wall of the
10 annulus fibrosus, which force is insufficient to puncture the annulus fibrosus; and

11 delivering energy to the disc tissue using the electrode.

1 2. The method of claim 1, wherein the catheter defines a lumen.

1 3. The method of claim 1, wherein the step of providing a catheter is followed by
2 the steps of:

3 providing an introducer with a proximal end and a distal end and having an introducer
4 lumen with a distal opening at a terminus of the introducer;

5 inserting the introducer into the disc so that the proximal end of the introducer is
6 external to the body and the distal opening of the introducer lumen is internal to the body;
7 and

8 slidably inserting the catheter into the introducer.

1 4. The method of claim 3, wherein the distal end of the introducer is internal to
2 the nucleus pulposus.

1 5. The method of claim 3, wherein the distal end of the introducer is adjacent to
2 an opening in the annulus fibrosus communicating with the nucleus pulposus.

6. A method of manipulating a disc tissue at a selected location of the intervertebral disc, the disc having a nucleus pulposus, an annulus fibrosus, and an inner wall of the annulus fibrosus, the method comprising:

providing a catheter having a radiofrequency electrode at a distal region of the catheter and a proximal region for externally guiding the distal region of the catheter within an intervertebral disc;

positioning the electrode at the selected location of the disc by applying a sufficient force to advance at least a portion of the distal region of the catheter through the nucleus pulposus beyond a central region of the nucleus pulposus, which force is insufficient to puncture the annulus fibrosus; and

removing material at the selected location of the disc using the electrode.

7. A method of manipulating a disc tissue of an intervertebral disc, the disc having a nucleus pulposus, an annulus fibrosus, and an inner wall of the annulus fibrosus, the method comprising:

providing a catheter having a radiofrequency electrode at a distal region of the catheter and a proximal region for externally guiding the distal region of the catheter within an intervertebral disc;

positioning the electrode at a location selected from the group consisting of posterior medial inner, posterior lateral, anterior lateral and anterior medial wall of the annulus fibrosus or combinations thereof by applying a sufficient force to advance at least a portion of the distal region of the catheter through the nucleus pulposus beyond a central region of the nucleus pulposus, which force is insufficient to puncture the annulus fibrosus; and

delivering energy to the disc tissue using the electrode at the selected location.

8. A method of manipulating a disc tissue of an intervertebral disc, the disc having a nucleus pulposus, an annular fibrosus, and an inner wall of the annulus fibrosus, the method comprising:

providing a catheter having a radiofrequency electrode at a distal region of the catheter and a proximal region for externally guiding the distal region of the catheter within an intervertebral disc;

positioning the electrode at a first selected location of the disc by applying a sufficient force to advance at least a portion of the distal region of the catheter through the nucleus pulposus beyond a central region of the nucleus pulposus, which force is insufficient to puncture the annulus fibrosus;

delivering energy to the disc tissue at the first selected location of the disc using the electrode;

positioning the electrode at a second selected location; and

delivering energy to the disc tissue at the second selected location of the disc using the electrode.

9. A method of manipulating a disc tissue at a selected location of an intervertebral disc, the disc having a nucleus pulposus, an annulus fibrosus, and an inner wall of the annulus fibrosus, the method comprising:

providing a catheter having a radiofrequency electrode at a distal region of the catheter and a proximal region for externally guiding the distal region of the catheter within an intervertebral disc;

positioning the electrode at the selected location of the disc by twisting the proximal region of the catheter and applying a sufficient force to advance at least a portion of the distal region of the catheter through the nucleus pulposus beyond a central region of the nucleus pulposus, which force is insufficient to puncture the annulus fibrosus; and

delivering energy to the disc tissue at the selected location of the disc using the electrode.

10. A method comprising:

introducing an intervertebral disc apparatus within an intervertebral disc such that a radiofrequency electrode incorporated into the apparatus at a distal region of the apparatus is advanced beyond a central region of a nucleus pulposus of the disc to a selected location; and

delivering energy from the electrode positioned at the selected location such that no vaporization of intervertebral disc tissue occurs when energy is delivered.

11. A method comprising:

2 introducing an intervertebral disc apparatus within an intervertebral disc such that a
3 radiofrequency electrode incorporated into the apparatus at a distal region of the apparatus is
4 advanced beyond a central region of a nucleus pulposus of the disc to a selected location; and
5 delivering energy from the electrode positioned at the selected location such that no
6 material other than water is removed at the selected location of the intervertebral disc when
7 energy is delivered.

1 12. A method comprising:

2 introducing an intervertebral disc apparatus within an intervertebral disc such that a
3 radiofrequency electrode incorporated into the apparatus at a distal region of the apparatus is
4 advanced beyond a central region of a nucleus pulposus of the disc to a selected location; and
5 delivering energy from the electrode positioned at the selected location such that no
6 destructive lesion is formed on a disc at the selected location of the intervertebral disc when
7 energy is delivered.

1 13. A method comprising:

2 providing a catheter having a radiofrequency electrode at a distal region of the
3 catheter;
4 advancing the electrode beyond a central region of a nucleus pulposus of an
5 intervertebral disc to a selected location; and
6 delivering energy from the electrode positioned at the selected location.

1 14. The method of claim 13, wherein the electrode is positioned adjacent a portion
2 of an inner wall of the disc which forms a region of the disc selected from the group
3 consisting of: a posterior medial, posterior lateral, anterior medial and anterior lateral region
4 of the inner wall of the annulus fibrosus.

1 15. The method of claim 13, wherein the electrode is positioned at a site of an
2 annular fissure of the inner wall of the disc.

1 16. The method of claim 13, wherein delivering energy includes delivering
2 thermal energy or electromagnetic energy.

1 17. The method of claim 13, wherein delivering energy includes delivering a
2 controlled amount of energy such that no vaporization occurs in the disc.

1 18. The method of claim 13, wherein delivering energy includes delivering a
2 controlled amount of energy such that no material other than water is removed from the disc.

1 19. The method of claim 13, wherein delivering energy includes delivering a
2 controlled amount of energy such that no destructive lesion is formed in the disc.

1 20. A method comprising:
2 providing a catheter having a radiofrequency electrode at a distal region of the
3 catheter;
4 positioning the electrode in the intervertebral disc;
5 advancing the electrode non-linearly within the intervertebral disc beyond a central
6 region of a nucleus pulposus of the disc to a selected location; and
7 delivering energy to the selected location from the electrode positioned at the selected
8 location.

1 21. The method of claim 20, wherein the electrode is positioned adjacent an inner
2 wall of the disc.

1 22. The method of claim 20, wherein the electrode is advanced along a path with
2 multiple degrees of curvature.

1 23. The method of claim 20, wherein the electrode is advanced to an inner wall of
2 the disc.

1 24. The method of claim 20, wherein the selected location is selected from the
2 group consisting of a posterior medial, posterior lateral, anterior medial, and anterior lateral
3 region of an inner wall of an annulus fibrosus.

1 25. The method of claim 20, wherein the selected location is at a site of an annular
2 fissure of an inner wall of the disc.

1 26. The method of claim 20, wherein delivering energy includes delivering
2 thermal energy or electromagnetic energy.

1 27. The method of claim 20, wherein delivering energy includes delivering a
2 controlled amount of energy such that no vaporization occurs in the disc.

1 28. The method of claim 20, wherein delivering energy includes delivering a
2 controlled amount of energy such that no material other than water is removed from the disc.

1 29. The method of claim 20, wherein delivering energy includes delivering a
2 controlled amount of energy such that no destructive lesion is formed in the disc.

1 30. The method of claim 20 wherein advancing the electrode non-linearly within
2 the intervertebral disc comprises conforming the catheter sufficiently to an inner wall of an
3 annulus fibrosus to contact multiple locations on the inner wall.

1 31. A method for delivering a controlled amount of energy adjacent an inner wall
2 of an intervertebral disc comprising:

3 introducing an intervertebral disc apparatus within an intervertebral disc such that a
4 functional element incorporated into the apparatus adjacent a distal end of apparatus is
5 positioned adjacent a wall of the intervertebral disc; and

6 delivering energy from the functional element to the wall of the intervertebral disc such
7 that no vaporization of intervertebral disc tissue occurs when energy is delivered.

1 32. A method for delivering a controlled amount of energy adjacent an inner wall
2 of an intervertebral disc comprising:

3 introducing an intervertebral disc apparatus within an intervertebral disc such that a
4 functional element incorporated into the apparatus adjacent a distal end of apparatus is
5 positioned adjacent a wall of the intervertebral disc; and

6 delivering energy from the functional element to the wall of the intervertebral disc such
7 that no material other than water is removed at or near the wall of the intervertebral when
8 energy is delivered.

1 33. A method for delivering a controlled amount of energy adjacent an inner wall
2 of an intervertebral disc comprising:

3 introducing an intervertebral disc apparatus within an intervertebral disc such that a
4 functional element incorporated into the apparatus adjacent a distal end of apparatus is
5 positioned adjacent a wall of the intervertebral disc; and

6 delivering energy from the functional element to the wall of the intervertebral disc such
7 that no destructive lesion is formed on a disc at or near the wall of the intervertebral disc
8 when energy is delivered.